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ABSTRACT

A research project was undertaken to investigate the acquisition of the English sound system by kindergarten children of various first language backgrounds. Sixteen children were selected from three kindergartens in Prince Rupert, British Columbia according to the following criteria: (1) no English was spoken by parents; (2) the child scored 3 or less on the "Bilingual Syntax Measure"; and (3) the child was willing to talk to investigators. The focus of the study was on first language interference, phonological errors that might be common to all learners, commonality with native speakers of misarticulation of consonant sounds, and commonality of phonetic processes between native speakers and children learning English as a second language. The children were tape recorded once every two weeks during the school year. Preliminary analysis of the data suggests that there may be a common developmental sequence in the acquisition of the English sound system consisting of a period of imitation, a period of deviation during which the child makes systematic errors, and a long period of resolution. With regard to the four issues focused on in this study, the preliminary analysis finds little support for the claim of language interference. It does find consistent misarticulations and commonality of these with native speakers' misarticulations. Only one phonological process, that of simplification, was found to be systematic and common to several of the subjects. (AMH)

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Solving the English Phonological Puzzle

Terry Piper

In September of 1980, a research project was begun in Prince Rupert, British Columbia on the acquisition of English as an additional language by kindergarten children of various first language backgrounds. In particular, the research investigated the acquisition of the sound system, attempting to answer the following questions:

1. Is there interference from children's first language in the acquisition of the English sound system?
2. Are there phonological errors which are common to all learners no matter what their first language?
3. Do ESL children misarticulate the same consonant sounds as do primary-aged native speakers (mainly /s, t, l, θ, č, ǰ, w/)?
4. Are common phonetic processes found in the speech of young native speakers also found in the speech of ESL children? For example, in acquiring their first language, English-speaking children frequently exhibit consonant harmony in their articulation of words such as *baba* ('bottle') and *goggie* ('doggie'). Are there *babas* and *goggies* in the speech of older ESL children?

METHOD

Subjects

Sixteen children were selected from three kindergartens in Prince Rupert according to the following criteria:

1. No English was spoken by the parents;
2. The child scored 3 or less on the *Bilingual Syntax Measure* (BSM) (Burt, Dulay, and Hernandez, 1975);
3. The child was willing to talk to the investigators.

The subjects represented six first language backgrounds including Portuguese (4), Vietnamese (2), Chinese (5), Punjabi (3), Hungarian (1), and Italian (1). The children were not in special ESL kindergarten classes but in regular kindergarten classes for two hours each day and then with an ESL teacher for an additional 45 minutes. She played language games with them, worked on oral vocabulary development and taught them songs, but did no formal, structural language activities.

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Procedure

Subjects were tape-recorded once every second week from the first week in September until the middle of June. Each taping session after the initial session was a combination of BSM-elicited and free conversation or a picture-book presentation and free conversation. During the first session, the BSM data were the only data the researchers were able to elicit. The children liked the pictures and most would respond. By the second taping session, after three weeks in kindergarten, they responded well and often offered their own commentary on the pictures, somewhat fanciful at times. One investigator controlled the tape-recorder and made notes about context and situation while the other investigator, the ESL teacher, talked to the child.

The data were transcribed, first into standard orthography and then a phonetician, working from the tapes and the orthographic transcripts, transcribed the data into close phonetics. The phonetic transcripts were examined for instances of deviance from standard English pronunciation. As there is great variability in the acceptable range of vowel pronunciations and as vowel articulation causes relatively little difficulty in the speech of young native speakers, it was the consonants that were of principal interest. Each misarticulation was categorized according to phonological process (e.g., substitution, devoicing, deletion, nasalization, and aspiration) and sub-categorized according to place and manner of articulation. This categorization produced a detailed account of each child's phonological development over time.

RESULTS

While the analysis of the data is not yet complete, it is nevertheless possible to make some preliminary observations about the subjects' acquisition of English phonology. The data suggest that there may be a common developmental sequence in the acquisition of the English sound system. The sequence seems to involve a period of *imitation* during which the child makes few pronunciation errors, followed by a period of *deviation* during which the child begins to make a series of systematic errors and then by a long period of *resolution* during which the child gradually replaces the deviant forms through a series of mostly regular and predictable approximations to the target forms.

It should be stressed that these are not fixed stages corresponding to particular periods of time. Nor are there clear beginning and ending points for each stage. The child does not one day drop all his near-perfect pronunciation in favour of a new set of deviant forms. The deviant forms appear gradually, though systematically in most cases, and they disappear in much the same way. The notion of a developmental stage, then, is useful for describing the process of phonological acquisition as long as it is regarded not as a discrete point along a continuum but as a shady area whose boundaries are indistinct but which is identifiable nonetheless.

Stage One: Imitation

Of the sixteen children studied, the four who were true beginners according to

the BSM and teachers' observations were at this stage early in September when taping began. Asked to repeat words after their teacher, they did so with few pronunciation errors. Nor did they make noticeable errors in elicited (but non-repetition) speech. For example, all four children at this stage produced *th* sounds correctly during the first taping session, though by the third session all were producing mostly deviant forms (usually [d]). Perhaps most interesting about this first stage, however, was the child's movement out of it and into a stage characterized by deviance from the target forms.

Stage Two: Deviance

During this stage, children who had previously produced mostly correct articulations of the English consonants began to make systematic errors. The four children mentioned above moved into this stage during the first few weeks of the investigation and it is from their data that the most interesting observations were made. The remaining twelve children were at this stage (three near the end of the stage) when taping began.

There were four major changes which occurred during this period.

1. Previously correct articulation of /ð/ (as in *this*) became [d̪] (articulated with the top of the tongue just touching the inside of the front teeth) and then gradually stabilized as [d]. A sample of the data from one of the Chinese speakers serves to illustrate the transition from the first to the second state:

	/ð/ → [ð] (correct)	/ð/ → [d̪]	/ð/ → [d]
September 12	they're the them ...		
October 3	they's the they're ...		
October 17	they the this ...	they're them	
October 31		these those this	that them this the
January 9			this that them the they're there ...

2. Many voiced consonants were devoiced. The first instance of this change was, in all cases, from /z/ to [s], first in the plural inflection and later in other environments. After the /z/ was effectively eliminated from the child's phonemic inventory, certain other sounds underwent the same devoicing process. Sample data from a Punjabi speaker illustrate:

	/z/→[z]	/z/→[s]	/g/→[g]	/g/→[k]	/v/→[v]	/v/→[f]	/d/→[t]
September 12	nose he's	fishes was	doggie dog		have five		
October 3		wings these those stores nose ...		dog		have	
January 30		doesn't was keys she's cause ...				have give five	ground round

3. The deletion of consonants began in most children at about the same time as devoicing of the consonants other than /z/. For most children, the deletions seemed to be of two types — consonant cluster reduction and the dropping of word-final consonants. Further data from the Punjabi speaker mentioned above illustrate this process:

	/d/→[d] (correct)	/d/→[t]	/d/→∅ (deleted)	/t/→[t] (correct)	/t/→∅ (deleted)	other deletions
November 14	brea*d*s win*d*ows *d*ad's gar*d*ens bir*d*s ...			wet foot but that too ...		
January 9	*d*oors *d*oes *d*ad's birth*d*ays *d*id ...		frien*d*s da*d*s di*d*n't	sit it built not teacher pant ...	nest won't want not didn't getting	like (/k/) house (/s/) *h*e, *h*is, *h*e's (/h/)
January 30	rea*d*ing birth*d*ay an*d* turne*d* *d*idn't frien*d*	ground ground	frien*d*s di*d*n't frien*d*'s	today little teacher turned talks not ...	doesn't ourside that's just getting not	stomach (/k/)

4. Aspiration of consonants, either in an inappropriate environment or to an excessive degree, characterized the speech of eleven of the sixteen children at some time during this stage. Data from a Portuguese speaker are typical of the pattern exhibited by these children:

September 12	no abnormal aspiration
October 3	'put' [put^{h}] (2) 'boat' [bot^{h}] 'want' [want^{h}]
October 17	'that' [dæt^{h}] 'cat' [kæt^{h}]
October 31	'chair' [ɛ̌^{h}ɛr] 'fat' [f^{h}æt]
January 9	'happy' [hæp^{h}i] 'this' [ð^{h}ɪs]
March 27	'house' [h^{h}aus] 'skipping' [sk^{h}ɪpɪŋ] 'bridge' [b^{h}rɪ̆]

Inappropriate aspiration was confined at first to /t/ but was later generalized to other consonants in what seems to be a rather random manner (except that /t/ was no longer affected). In fact, the pattern is not random. Rather, the data from October 31 on suggest that the child has overgeneralized the rule, aspirate /p/, /t/, and /k/ at the beginning of a word, to all word initial consonants.

Stage Three: Resolution

For most children, the deviant articulations stabilized at some point, becoming the rule rather than the exception. Within a few weeks after this stabilization occurred, change began again in the direction of the target form. With some children the change was abrupt: the [d] that had been produced for /ð/ was suddenly replaced by [ð]. Most, however, reversed the pattern which had produced [d] (/ð/ → [d̪] → [d]) and produced [d̪] for a while before returning to the correct form, [ð]. A sample of the data from a Portuguese speaker illustrates this process:

	/ð/ → [d]	/ð/ → [d]	/ð/ → [ð] (correct)
November 14	there that (4) those (4) the them this (6)	those (1)	
January 9	they're the that's	the they that	
May 15		they (2) the (2)	this(3) these those that (4)
June 10			this (4) these (2) that those ...

Two children exhibited a similar pattern with /z/, producing a partially-voiced [z̬] at first and then fully voicing it correctly as [z], but as the remaining 14 children were still devoicing /z/ when taping ended in June, no claims can be made about the universality of this particular process.

DISCUSSION

Since the data are not yet fully analyzed, the results amount to little more than clues to the phonological puzzle. Nevertheless, it is possible to propose certain tentative answers to the questions raised at the beginning of this article.

1. At this point in the analysis, the speech data of the sixteen children offer very little evidence to support a claim of negative interference from their native languages. There seem to be few, if any, misarticulations of individual sounds attributable to first language influence. There was, however, one process apparent in the speech of two of the children which bears further investigation. That process was excessive nasalization and affected the speech of the two Vietnamese children during the second stage. This nasalization tended to occur when the children were attempting to repeat unfamiliar words and words of three or more syllables. They seemed, in other words, to be operating under a rule rather like "If the sounds are difficult, nasalize them."

Whether excessive nasalization is typical of young Vietnamese ESL learners is not yet documented and certainly more evidence is required before any valid claims can be made about the influence of the first language on the process. In the case of the two children in this study, an equally tenable explanation is that the idiosyncratic speech of one of the children influenced the speech of his friend, the other Vietnamese child.

2. In answer to the question regarding common errors, the data support an unqualified yes. Indeed, the data on the misarticulations of the children studied are remarkable in their consistency. At some time during the study, all the children produced incorrect variants of /z,ð,θ/ and many produced /v,l,r/ incorrectly as well. On the other hand, each child produced a number of idiosyncratic misarticulations, but few of these seemed to be related to the first language backgrounds of these children.

3. The misarticulations common to most of the ESL children are a subset of those which occur most frequently in native speakers. The particular subset is interesting, however, in that it includes, with the exception of /θ/, only voiced sounds. Voiced consonants are thought to be more readily perceived because they have at least two sound sources — one at the glottis where the vocal folds open and close and the other(s) at the point(s) of vocal tract constriction. Their multiple sound source, however, may contribute to their difficulty for children trying to produce them. Why this would be true for ESL learners but not for native speakers is a matter for speculation, of course, but it may be the case that because of their past linguistic experience, ESL learners attend to different phonetic cues in their perception of the consonant sounds and that affects their pronunciation. What is almost certainly not a factor is physiological difficulty. The fact that children are able to produce certain sounds correctly in the first stage, [z] and [ð] for example, before moving into the second stage rules out physiological complexity as a primary cause of later difficulty. It also supports the anecdotal and empirical observations of parents, teachers, and researchers that children of this age are good mimics.

4. The data for the ESL children revealed many instances of phonological processes commonly found in the speech of native learners. Only one of these, however, was systematic and common to several of the subjects. This was the process of simplification, mentioned above, involving the reduction of consonant clusters to a single consonant. The next step in the analysis is to examine these processes in greater detail and to compare them with native language data.

The study reported here supplies only a few small pieces to the puzzle of phonological acquisition. Considering that the phonological puzzle is only a corner of the much larger puzzle of second language acquisition, the contribution may seem minor. But such contributions are necessary to our understanding, for example, of certain factors which characterize second-language learner

systems. Sampson and Richards (1973) identify seven factors which influence this system. Among these are language transfer, intralingual interference ("the items produced by the learner which reflect, not the structure of the mother tongue, but the generalizations based on partial exposure to the target language" (p. 19)), age, successions of approximative systems ("the lack of stability of the learner's approximative system" due partly to the differences between individual learners (p. 21), and the "universal hierarchy of difficulty,... concerned with the inherent difficulty of certain phonological, syntactic, or semantic items and structures" (p. 22).

The results of this study suggest the minimal role of language transfer in the acquisition of the sound system for children of five and the relatively important role of individual differences. They also indicate that while the inherent difficulty of certain speech sounds affects the learner's system, only a few of the problems ESL learners experience with the English sound system can be predicted on this basis. These kinds of information, together with the insights about both the stability and the instability of the system which may be common to all learners, are important in furthering our understanding of the complex task of learning English as an additional language.

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